

**AFRL-WS-WP-TR-2000-9002**

**SCIENCE AND TECHNOLOGY  
BUSINESS AREA STRATEGIC PLAN**

**FY00-FY07**



**S&T CHIEF OPERATING OFFICER  
MAJ GEN RICHARD PAUL, COMMANDER  
AIR FORCE RESEARCH LABORATORY**

**MAY 2000**

**PUBLIC RELEASE; DISTRIBUTION UNLIMITED**

**20000516 094**

**AIR FORCE RESEARCH LABORATORY  
AIR FORCE MATERIEL COMMAND  
WRIGHT-PATTERSON AIR FORCE BASE, OH 45433**

**DTIC QUALITY INSPECTED 2**

**SCIENCE AND TECHNOLOGY**  
**BUSINESS AREA STRATEGIC PLAN**  
**FY00-FY07**

**S&T CHIEF OPERATING OFFICER**  
**MAJ GEN RICHARD PAUL, COMMANDER**  
**AIR FORCE RESEARCH LABORATORY**

## **TABLE OF CONTENTS**

INTRODUCTION .....	3
SECTION A:	
OVERVIEW .....	4
SECTION B:	
PLANNING ENVIRONMENT .....	7
SECTION C:	
MOST PROBABLE FUTURE .....	9
SECTION D:	
MISSION ESSENTIAL TASKS (METs) .....	11
SECTION E:	
STRATEGIC OBJECTIVES ACTION PLAN .....	13
COMMAND STRATEGIC OBJECTIVE: WEAPON SYSTEMS .....	24
COMMAND STRATEGIC OBJECTIVE: COST.....	28
COMMAND STRATEGIC OBJECTIVE: WORKFORCE.....	32
COMMAND STRATEGIC OBJECTIVE: INFRASTRUCTURE .....	34

## **INTRODUCTION**

The S&T Business Area Strategic Plan has been updated to include lessons learned over the last two years, identifies areas that need to be reviewed further, addresses business opportunities and threats. The format is the same as in the original plan; however, this revision attempts to correct shortfalls in our planning in the area of Unit Cost Reduction. Metrics for Mission Essential Task 6 were also changed given our experience and the establishment of the Applied Technology Council Process.



**"THE FIRST ESSENTIAL OF AIR  
POWER IS PRE-EMINENCE IN RESEARCH"**

**GENERAL H. H. ARNOLD, 1944**

## **SECTION A: OVERVIEW**

Through superior technology, the Air Force Research Laboratory provides the Department of Defense the ability to field the best-trained, best-equipped, best-prepared joint fighting force in the world. AFRL consists of nine technology directorates and the Air Force Office of Scientific Research (AFOSR). AFRL employs more than 5800 government people, who include over 1300 military and over 4500 civilian personnel. We have about 3200 scientists and engineers, of which over 700 have PhDs (Figures 1 and 2).

**VISION:** We defend America by unleashing the power of innovative aerospace technology. We will be the leaders in aerospace technology; meet warfighter needs; pioneer new capabilities and impact Air Force decision-making. The best people providing the best technologies for the world's best Air Force.

**MISSION STATEMENT:** To discover, develop, integrate, and deliver affordable technologies for improved warfighting capabilities by leading a partnership of government, industry, and academia to keep the Air Force the best in the world.

**MISSION:** To lead the discovery, development, and timely transition of affordable, integrated technologies that keep our Air Force the best in the world. Advance and focus enabling technologies in all the disciplines supporting, Avionics, Aero Propulsion and Power, Materials, Manufacturing, Electronics, Munitions, Directed Energy, Space, Information & Communications, Human Systems, and Aeronautics. AFRL pursues technologies that can provide evolutionary and revolutionary improvements in the performance, affordability, and supportability of weapon systems. Our mission reflects what we do, how we do it, and why we do it.

**CUSTOMERS:** The S&TBA have two types of customers, Warfighting and Technology. The Warfighting customer is made up of the USAF Major Commands working at the operational unit level. The Technology customer uses the technology products produced by AFRL in creating the systems used by the warfighter.

**RESOURCES:** The S&TBA expected revenue in FY00 is \$2.35 billion with S&T organic funding providing \$1.18 billion and the remainder of \$1.17 billion provided by external customers, military payroll and Base Operating Support costs. Revenues through FY07 are expected to be level to slightly decreasing in real dollars.

The S&TBA budget is executed by approximately 5800 government personnel, 1300 military and 4500 civilians. They are assigned throughout nine technology directorates and the Air Force Office of Scientific Research (AFOSR). These people perform a variety of duties from technology development to contracting and financial management.

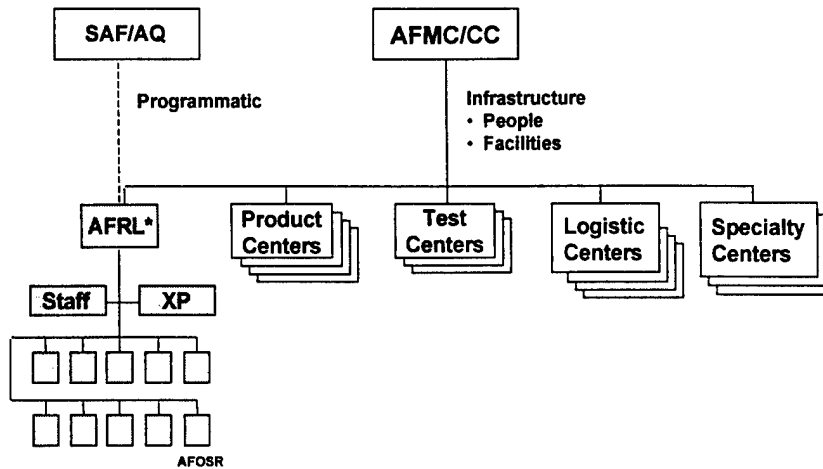
**BUSINESS LINES AND EMPHASIS AREAS:** The S&TBA performs its mission within two business lines and corresponding emphasis areas:

#### BUSINESS LINES:

1. PRODUCT SUPPORT: The management and administration associated with the in-house and contractor technology programs within AFRL.
2. PRODUCT: In-house research and other research accomplished under contract by AFRL's partners in industry and academia.

#### EMPHASIS AREAS:

1. Reduce the amount of revenues devoted to product support relative to total revenues. These reductions will be realized in the areas of cost, workforce and infrastructure.
2. Leverage those savings to provide more technologies for the warfighter. The realized savings will be executed in further meeting cost reductions and meeting the agile combat support and weapons objectives outlined by AFMC.



\*AFRL/CC is dual-hatted as TEO reporting to SAF/AQ

Figure 1: AFRL Structure

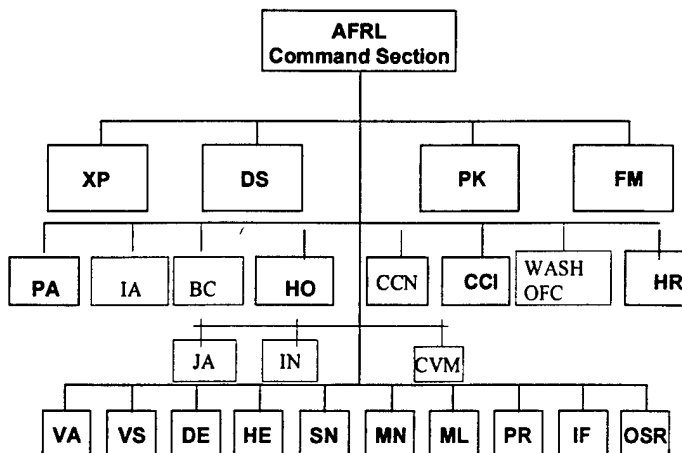


Figure 2: AFRL Staff

## **SECTION B: PLANNING ENVIRONMENT**

### **TREND**

The S&T budget is decreasing in real terms; therefore, modernization of existing systems will be the trend to satisfy changing operational requirements. The Air Force is moving towards air and space superiority and S&T will emphasize technologies supporting space applications. Trend is to double Air Force technology funding for space, from the FY99 baseline by 2005. Refer to Figure 3, AFRL Investment.

### **STRATEGIES**

The S&T Investment Planning Process (S&TIPP) is the framework for implementing AFRL's strategies. The S&TIPP provides an end-to-end process for technology planning, development, transition, and application/insertion. This process ensures that all needs for both external and internal AFMC customers are identified and prioritized, dollar-constrained technology projects are formulated in a highly integrated manner with full participation by all stakeholders to satisfy those needs, and any technologies flowing from the laboratory into AFMC centers to support the acquisition process are validated to reduce risk during the full acquisition cycle.

### **STRENGTHS**

AFRL's strength lies in responding to customers' needs and continuously improving the processes that enable us to meet those needs. AFRL has established six broad initiatives to guide its efforts. These initiatives are to improve AFRL's quality assessment and Strategic Investment Planning process, to focus on key strategic technologies, to accelerate the S&T affordability initiative, to improve the quality of AFRL's in-house workforce, to improve the S&TIPP, and to continue AFRL's strong technology transfer and marketing initiatives. AFRL will especially focus on information technology, working to ensure AFRL's capability to employ and multiply the impact of a diminishing force structure. AFRL will also continue to emphasize the "space" component of the Air Force air and space forces by providing specific emphasis on space-based technology demonstrations.

### **CHALLENGES**

AFRL must establish an integrated series of metrics to determine the critical military worth of particular technologies and the required level and persistence of the resources needed to achieve transition of those technologies. AFRL is continuing the Integrated Product and Process Development initiative in balance with performance and sustainability in all of AFRL's technology development activities. Current S&T budget



reductions could impact strategic objectives, specifically the Cost, Workforce and Infrastructure objectives.

## OPPORTUNITIES

AFRL has a vibrant and balanced workforce and is continuing to retain and attract top-quality researchers. Various training programs are in place for personnel to enhance their skills and qualifications.

AFRL seeks opportunities to continually modernize our facilities, services, and working conditions because a first-class infrastructure is key to the support of world-class research. To seek out these opportunities for improvement, and to respond to the needs of the Air Force and DOD, AFRL has integrated its major technology programs across directorates in the form of Integrated Technology Thrusts (ITTs). The ITTs are groupings of related, high-visibility programs that support the warfighter's highest priority needs. AFRL will continue to maximize opportunities to restore the S&T budget in Congress.

## **SECTION C: MOST PROBABLE FUTURE**

AFRL has embarked successfully on the journey to ensure it will continue to provide the Air Force with the world's best technology in the 21<sup>st</sup> century.

Organizational consolidation from four labs to a single lab in FY98 continues to allow AFRL to be more efficient and more focused. The single lab provides greater multidisciplinary technology solutions to its customers. AFRL is now gaining an understanding of how individual activities affect the cost and quality of Science and Technology products. We will continue to reduce costs while enhancing the quality of the product.

The Science and Technology Business Area is funded with the Research and Development appropriation and the budget is expected to remain constant in real terms over the next 5 years. A shift in AFRL's workload is expected as a result of the new challenges associated with an increased investment in space technology (Figure 3).

AFRL does not anticipate an increase in its personnel end-strength over the planning period. AFRL took personnel reductions in an effort to become more efficient in the earlier planning timeframe and authorizations are expected to remain relatively constant over the next 5 years. AFRL is continuously evaluating its current workforce and will continue to do so to ensure we can meet the challenges on the horizon.

S&T's business area focus will remain the same over the next 5 years. Several processes have been established within AFRL to determine which technologies will be transitioning to meet customers' needs and continuing to improve business management is an essential part of our standard way of doing business.

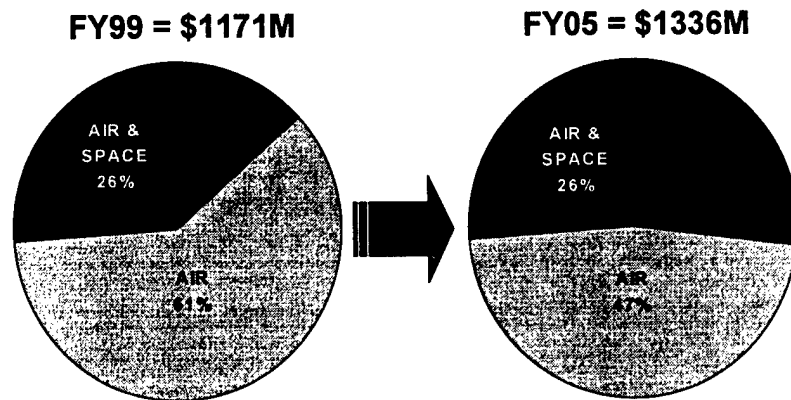
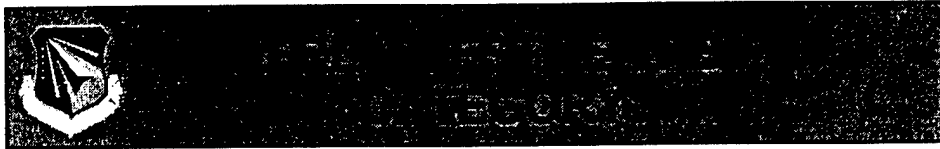


Figure 3: AFRL Investment

## **SECTION D: MISSION ESSENTIAL TASKS (METs)**

In March 1998, AFMC/CC identified nine METs to be performed in support of the Air Force Core Competencies. The Science & Technology business area is OPR for AFMC Task 6: Demonstrate and transition affordable advanced technologies to better achieve Air Force Core Competencies. While technological superiority remains a guiding objective, the alignment of Science and Technology corporate strategies with Air Force core competencies demand a more balanced approach to technology, product and process development.

### **Subtask:**

1. Develop and deliver affordable technologies through use of Advanced Technology Demonstrations (ATD).

Customer: MAJCOMs/AFMC Product Centers/Industry

### **Performance Measure:**

- a. Percentage of 6.3 budget in commissioned ATDs programs.
- b. Percentage of 6.3 budget in Cat 1 ATD programs.

### **Performance Measure Defined.**

#### **Transition of technology via ATD using the Applied Technology Council (ATC):**

The ATC is a senior-level management forum to facilitate timely and affordable technology transition. The objectives of the ATC are to link top-priority S&T investments with planned system acquisition investments; establish organizational accountability for management of technology transition; coordinate technology investments across AFMC Product Centers, AFRL, industry and Air Force Major Commands (MAJCOMs). The ATC reviews all proposed AFRL 6.3 advanced development technology programs to determine which programs to designate as Advanced Technology Demonstration programs. ATD candidates are assigned to three categories:

1. MAJCOM committed to transition with POM funding
2. MAJCOM interested on technology, but not able to make POM commitment
3. MAJCOM not currently interested, program continuation at discretion of AFRL/CC

All 6.3 advanced development technology programs for which the MAJCOMs show interest and support will be labeled "commissioned ATDs". Applied technology roadmaps will be created to illustrate linkage of ATDs to planned system acquisition programs. This will ensure highly coordinated investment strategies between technology development and system acquisition, including POM funding for development and transition of technology to current and future weapon systems. A Technology Transition

Plan will be generated for each Category 1 ATD program. The ATC products are: a list of all designated ATD programs (per category), approved Technology Transition Plan for each ATD program, and applied technology transition roadmaps.

The ATC process is summarized as follows: The ATC will meet approximately every six months. There will be separate ATC meetings with each MAJCOM to address and influence the S&T POM/APOM. A MAJCOM ATC meeting will be held each spring to influence the MAJCOM POM/APOM generation and address pervasive issues. The MAJCOMs will identify ATDs by category.

[Standard: 15% of the FY00 6.3 budget in commissioned ATD programs, growing to 50% by FY05.][2.5% of the FY00 6.3 budget in Cat 1 ATD programs, growing to 25% by FY05]

## **SECTION E: STRATEGIC OBJECTIVES ACTION PLAN**

**COMMAND STRATEGIC OBJECTIVE: EXPEDITIONARY AEROSPACE FORCES**  
“Support EAF implementation by achieving AFMC commitments in the areas of Operations Support, Logistics and Modernization by FY05.”

This section is an updated summary of the S&T Business Area initiatives that support the AFMC Command Strategic Objective.

**AFRL S&T OBJECTIVE 1:** AFRL will continue to provide improved Air Force capability by developing innovative technology solutions to meet user requirements that will aid in organizing, training, equipping, and sustaining expeditionary operations across the spectrum of conflict.

**ACHIEVEMENT STRATEGY:** Following the lead of the Air Force vision of Global Engagement and Vigilance, the Air Force Research Laboratory (AFRL) has created an EAF Emphasis Area to focus specific attention on technologies which directly support or enable the accomplishment of operations support, logistics and system modernization.

Investing in technologies that will develop lighter, leaner, and more lethal weapon systems and their support structures requires the ability to identify and track which current or planned technologies within AFRL are related to AFMC's AEF Modernization Plan. The identification process began with AFRL orchestrating the first AEF Technology Directorate (TD) Working Group, tasking the group to create the AFRL AEF-related Technology Portfolio. The Working Group, composed of members from each of the AFRL Technology Directorates, reviewed all technology programs within their representative Directorates in order to identify technologies that meet one or more of the AFMC IPT-determined AEF Objectives and AEF Criteria. Their selections were validated by AFRL and placed into the AFRL AEF Technology Portfolio. AFRL AEF-related technologies were then entered into an AFRL AEF Database containing pertinent program details such as funding profiles, ITT linkage, milestones, end dates, transition agencies, and customers. The AEF-related programs are organized around three major themes, Readiness, Deployment or Employment and further identified as applicable to either the near, mid or far-term (Figures 4-8).

The database is being used to link users' requirements/ needs and interest areas that are routinely solicited from Centers, MAJCOMs, and SPOs. Linking existing technology programs to the users' requirements validates investment in existing technologies, but also provides insight into areas of technology gaps; areas where there may be a requirement (present or future) without a technology program planned in that area. Recognizing gaps in technology development is vital in preparing roadmaps for future financial investments.

The complex pressures and conflicts inherent in cross-discipline portfolio development, analysis and management have led AFRL to seek cross-discipline integration

opportunities. Six Integrated Technology Thrusts (ITTs) have been established to work these issues. The ITTs serve as a vehicle to focus S&T investment on the critical needs associated with the aerospace force of the future.

The six ITTs are Space Superiority, Precision Strike, Information Dominance, Aircraft Sustainment, Agile Combat Support, and Training for Warfighting. AFRL has also recognized the importance of supporting this new ITT structure by standing up Colonel-level leadership (Sectors) for five of these ITTs. In response to the AF interest in improvements to the Joint Synthetic Battlespace (warfare analysis) and Simulation Based Acquisition (concept to sustainment – integration and analysis), AFRL has created the Modeling and Analysis Division.

A short descriptive summary for each of the six ITTs is presented below, followed by ITT linkage to AEF, and samples of current programs associated with the ITT.

Space Superiority ITT: Superior space operations are rapidly becoming an essential condition for the successful conduct of conflicts and this trend is likely to expand in the future. To achieve the required future capabilities in space operations, AFRL has increased its current investment in space, shifting resources externally across traditional lines as well as internally within focused technology areas.

The increased investments will help enable expanded space capabilities in the long term (2025), such as fielding spacecraft systems that are 100 times more capable at 100 times less weight and one-tenth the life cycle cost.

Space Optics and Lasers will play a pivotal role in the defense of the United States from foreign adversaries. AFRL investments will enable the long-term space capability of delivering directed energy tailored to any wavelength and power permitting engagement against any target. This will allow the Air Force to exert power projection and force illumination across the globe.

In the next decade, distributed satellites and their constellations will provide us affordable and timely information about the battlefield. AFRL investments will be targeted at the long-range capability of performing military missions with assured 90% survivability against manmade and natural threats.

AEF Linkage: Space based assets can augment air breathing vehicles and associated in-theater airlift, footprint and in-theater manpower (surveillance, intel, cargo delivery, supply, maintenance, facilities, etc.)

Technology Programs: Space Operations Vehicle; Satellite Survivability; Hyperspectral Imaging; Space Based Radar; Space Optics & Laser Technology.

Precision Strike ITT: The Air Force vision of Global Engagement provides a new perspective for precision strike. Stated in the simplest terms, AFRL must provide the technology base which will allow our future Aerospace Force, within an area of interest,

to be able to find, fix, track, target, engage and assess Time Critical Targets (TCTs) and Time Sensitive Targets (TSTs) before the enemy can employ or hide its assets.

By 2025 we will be able to: 1) find, fix and identify unhidden targets and hidden targets within a theater/Area of Interest, with minimal degradation due to adverse weather conditions, 2) maintain sufficient track quality on all identified mobile targets within a theater/Area of Interest so that they can be acquired and successfully engaged by friendly strike forces within minutes to hours of engagement, depending on the specific target class and priority, 5) under Theater Commander decision authority, conduct the entire F2T2E&A cycle within minutes for TCTs and within hours for TSTs, 6) reduce the EAF strike assets airlift requirements and logistics footprint by an order of magnitude, 7) conduct aerospace operations with impunity.

AEF Linkage: Miniaturized munitions, plus accuracy, means reduced collateral damage and reduced airlift and footprint; critical to overwhelming force early – “You can run but you can’t hide.”

Technology Programs: Small Smart Bomb; Automatic Target Recognition; UCAV; Real Time Sensor-to-Shooter Ops; LOCASS (powered); EO/IR Countermeasures; Sensor Protection; Hy Tech.

Information Dominance ITT: Information Dominance, or Information Superiority, is an Air Force core competency. It inherently supports the Aerospace Superiority, Global Attack, Rapid Global Mobility, Precision Engagement and Agile Combat Support core competencies and is a key enabler of the operational concepts in Joint Vision 2010. Information Dominance is inextricably interwoven with the Air Force’s overarching goals of operation as both an integrated aerospace force and an EAF, as well as the global ability to find, fix, track, target, engage and assess any targets of significance. The capabilities inherent in Information Dominance are reliant on the integration of aerospace forces to achieve unity of command and purpose and greater overall force effectiveness.

Cellular communication systems, direct broadcast satellite systems, overhead imagery, local and wide area networking and increased computing speeds allow increased availability and rapid dissemination of information to a large percentage of the world’s population. Global awareness will no longer be exclusive to the US and its allies.

Information technology holds the key to managing the battlefield of the future. The future space and air forces will operate in increasingly information-centric environments rather than platform-centric environments wherein the critical functions become maintaining situation awareness of who the enemy is, what is happening and understanding information warfare tactics and strategy. In this future environment, information becomes the force multiplier. Information systems are the highest leveraging systems in DOD which directly enable a smaller, yet more effective CONUS-based force that has worldwide responsibilities. The commander’s ability to observe, orient, decide and act will be greatly enhanced by systems that capitalize on information technology enabled capabilities.



By 2025 a commander will have continuous 24-hour-a-day in transit visibility of resources, (supplies and people) and global connectivity to all aerospace forces. This information infrastructure will provide on-demand assured universal access to information (all information/knowledge sources) anywhere in the world. Information attacks will be detected and the recovery effected in real-time.

AEF Linkage: Robust C2, reachback, in-transit visibility, Intel, real time replanning, etc.. the essential "Glue."

Technology Programs: Configurable Command Centers; Defensive Information Warfare; Dynamic Command & Control; Consistent Battlespace Picture; Global Grid.

Aircraft Sustainment ITT: Presently, the Air Force spends nearly \$50 billion annually in aircraft sustainment-related expenses, with projections of rapid cost growth as our aircraft fleet ages. By the end of the decade, over 75% of USAF aircraft will exceed 20 years of service. The extended use of many of these aircraft has resulted in exorbitant maintenance and repair costs due largely to structural cracking and corrosion problems. The USAF spends nearly \$800 million on direct corrosion maintenance of aircraft systems and equipment. To curb these escalating costs, and the growing number of days lost from operational service, it is critical for the AF to more accurately predict and determine the structural life of each aircraft. AFRL's programs focus on advanced prediction and detection techniques for locating, quantifying and repairing corrosion and fatigue damage critical to the assurance of airworthiness and fleet management. To meet this challenge, AFRL is investing in high impact, integrated technologies aimed at significantly reducing our aircraft fleet sustainment cost while increasing operational readiness. Research within the AFRL Aircraft Sustainment Integrating Thrust focuses on developing and transitioning technology solutions for the most critical of these sustainment-related areas, such as, Aging Aircraft Structures, Low Observables Maintainability, High Cycle Fatigue, and Turbine Engine Durability.

AEF Linkage: Reduced airlift, footprint, maintenance manpower, supply/support, reduced costs and increased asset availability.

Technology Programs: Aging Aircraft Structures; LO Maintenance; High Cycle Fatigue; Turbine Engine Durability.

Training for Warfighting ITT: The EAF is built on the principle of being "light, lean and lethal" (CSAF). To ensure this new expeditionary aerospace force can deploy (light), create decisive effects (lethal), and accomplish the mission effectively with minimum resources (lean), the warfighters must be properly trained; we must train the way we intend to fight.

Training these teams for every contingency is impractical and unachievable using today's training paradigm. The solution to training team roles and coordinated activities among geographically separated units is through universal and rigorous use of distributed

mission training (DMT). It is a simulation-based training, mixing live (real people in real systems and environments), virtual (real people in simulated systems and environments) and constructive (computer-generated representations of people and systems in simulated environments) elements.

DMT enables training, individually or collectively, at all levels of contingencies or war using local and long haul networks. DMT combines multiple players at multiple sites. Individual units and joint forces can participate in training exercises in a Joint Synthetic Battlespace while operating from their own location.

Achieving this capability with DMT requires an integrated information environment connecting mission planning, air operations, C2 and training into a seamless, global network. AFRL Directorates are participating in integration of technologies through the TFW ITT. Goals include embedded training in C2, intelligence and space control systems and complete mission training and rehearsal via simulations. DMT systems must be part of the global information network to ensure synthetic representations of the operational theaters within 24 hours. Distribution of assets for planning, rehearsal, execution, debriefs, and analysis can help reduce the EAF deployment footprint by deploying only those assets necessary in theater.

AEF Linkage: The tools to train the force, plan the deployment, deploy, beddown and protect the force where needed and execute the mission.

Technology Programs: Sim & Distributed Mission Training; Warfare Operations Center Training.

Agile Combat Support (ACS) ITT: ACS broadens the focus of combat support towards rapid movement of small, independent force packages to employ precise combat power anywhere in the world. Under ACS the focus of the support system shifts from maintaining massive inventories at overseas locations to establishing a rapid response capability. In addition to reducing deployment time and airlift, ACS focuses on reduced mobility footprint and base operations, a flexible deployed infrastructure, streamlined inventory and rapid, accurate, time-sensitive reach back.

AFRL Directorates have recognized the technical challenges inherent in meeting these objectives and developed specific technology "stretch goals" in response. The stretch goals are divided between mid-term and far-term global goals. The mid-term goals include technologies that will enable a force to respond in less than ½ the time currently needed, with less than 1/3 of the people forward, with 60% less support/beddown requirements to unprepared worldwide locations. For combat deployments, support airlift will be needed only for expendables.

The far-term goals include technologies to provide assets with no requirement for deployed maintenance on weapons delivery or support assets/platforms.

AEF Linkage: The ACS ITT is focused on achieving a cross-directorate attack on technology essential but not sufficient to achieve the objectives of an AEF. However, when combined with the technology contributions from programs within the other ITTs, AFRL products do provide the leverage needed for success.

Technology Programs: Deployment Operations; Deployed Base Support Systems; Remote Threat Detection; Active Denial.

Resources: Will be accomplished within approved funding and manpower.

Performance Measures: In order to analytically measure the cost and effectiveness of AFRL AEF-related technologies, AFRL has contracted an independent agency (Synergy Corporation) to create a baseline methodology that is applicable to most of AFRL's AEF-related programs. In November 1999 the first test case was run using the Small Smart Bomb program. The results of the test run indicated an ROI for the SSB consisting of weight reduction, weapons effectiveness and a small potential return from loading time reduction. Depending on the scenarios used, results vary. But, the ability to tailor the analysis model, setting specific parameters to match an operational environment, deployment variables, sortie generation assumptions, and weapon assumptions will allow the ROI analysis to be quite accurate. AFRL plans to use the analysis tool to get the ROI for the AEF-related programs being managed and funded by AFRL. The results of the ROI study of currently funded AEF-related AFRL programs can be used to make future investment decisions and recommendations, as well as validate or re-direct technology development strategy.

Exit Criteria: Continuing, ongoing. The AFRL AEF database will continue to evolve. The database will be kept current in order to provide accurate funding profiles, completion dates, and linkages to the implementation of EAF/AEF.

Sectors will continue to solicit user requirements and areas of interest by communicating openly and frequently with the customer. User requirements currently published will be updated as needed in the AFRL AEF database to better link requirements with laboratory programs and to identify those areas where technology should be applied.

Refining the capabilities of the ROI analysis tool will enable analysis of AFRL technologies to provide tangible data that can be used in making investment and applied technology decisions.

Together with our partners, AFRL will develop, integrate, demonstrate, and transition affordable technology products that result from our investment strategy. These products will contribute significantly to the implementation of AEF.



### Readiness

Atmospheric Measurements for Air Force Systems  
Atmospheric Measurements for ABL and Other Laser Applications  
Distributed Mission Training  
Night Vision Device Training Research  
Solar Thermal Conversion Technology  
Configurable Aerospace C2  
Information for Global Reach  
Collaborative Enterprise Environment Tech  
Engine Rotor Life Extension  
CCW Effects Experimentation  
CCW Source Research  
Remote Sensing Research

### Deployment

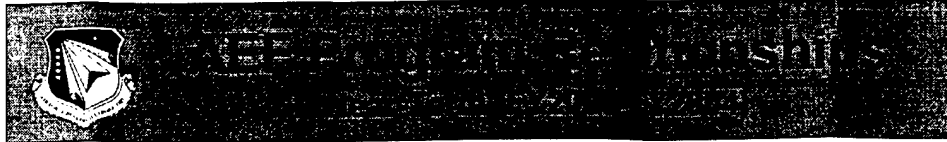
High Voltage Power Mgmt/Dist  
Log Control & Info Support  
Deployable Waste Mgmt System  
Cargo Handling Advanced Tech  
Modular A/C Support System  
Intelligent Adaptive Comm Controller  
Next Generation Transparency  
AEF Waste Disposal System  
Logistics Fuel Processor  
Base Base Solar Power System  
Advanced Cycle Mobile Heat Pump  
Air Inflatable Shelters  
Solar Thermal Power System  
Integrated Power Unit  
Deployable Fuel Cell Power/Dist  
Advanced Integrated Power System  
Advanced Shelter Development  
Rapid Airfield Assess/Repair  
Prognostics and Health Mgmt

### Employment

A/C Battle Damage Assess/Repair  
Foliage Penetration SAR  
IRCCA  
SSB: MMC Guided Flight Test  
SSB: Range Extension  
SSB: Non-Lethal Delivery Mechanisms  
SSB: Multiple Event Hard Target Fuze  
SSB: Small Munition Dispenser  
AMM: Powered LOCAAS  
AMM: TMD/LOCAAS  
AMM: Munition Integration Tech for CAV  
AMM: Miniature S/M Ordnance Package  
AMM: Dispensing Concepts Rqmts Study  
Consistent Battlespace Picture  
Chem Defense & Response  
Dynamic C2  
Warfare Agent Emission/Detect  
Advanced Laser Eye Protection  
Target Acquisition Weather Software  
NVG Operations Weather Software  
Weather Automated Mission Planning Software  
Global Ionospheric Impacts  
Force Protection Technology  
Deployed AEF LO Repair  
ADT Application  
ADT Support to ACS  
CCW Applications  
HMMWV System Development  
HMMWV Technology Development  
Remote Sensing Initiative

SSB = Small Smart Bomb; AMM = Antimateriel Munition; CCW = C2 Warfare; ADT = Active Denial Technology; LO = Low Observable

Figure 4: Major Themes



### Readiness

Atmospheric Measurements for Air Force Systems  
Atmospheric Measurements for Laser Applications

### Deployment

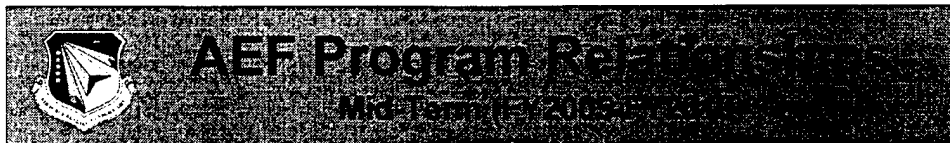
High Voltage Power Mgmt & Distribution  
Log Control & Info Support  
Deployable Waste Mgmt System  
Cargo Handling Advanced Technologies  
Modular A/C Support System  
Intelligent Adaptive Comm Controller  
Next Generation Transparency  
AEF Waste Disposal System  
Logistics Fuel Processor  
Bare Base Solar Power System  
Adv Cycle Mobile Heat Pump  
Air Inflatable Shelters  
Integrated Power Unit

### Employment

A/C Battle Damage Assess/Rpr  
Foliage Penetration SAR  
IRCCA  
SSB: MMC Guided Flight Test  
SSB: Range Extension  
SSB: Small Munition Dispenser  
AMM: Powered LOCAAS  
AMM: TMD/LOCAAS  
AMM: Munition Integration  
Technology for CAV  
Consistent Battlespace Picture  
Chem Defense & Response  
Dynamic C2  
Warfare Agent Emission/Detect  
Advanced Laser Eye Protection  
Target Acquisition Weather S/W  
NVG Operations Weather S/W  
Weather Automated Mission Planning S/W

SSB = Small Smart Bomb, AMM = Antimateriel Munition, CCW = C2 Warfare, ADT = Active Denial Technology, LO = Low Observable

Figure 5: Near-Term



### **Readiness**

Solar Thermal Conversion Technology  
 Configurable Aerospace C2 Information for Global Reach  
 Collaborative Enterprise Environment Technology  
 Engine Rotor Life Extension  
 Distributed Mission Training  
 Night Vision Device Training Research

### **Deployment**

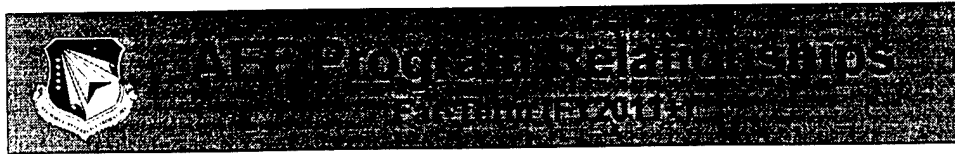
Solar Thermal Power System  
 Deployable Fuel Cell Power & Distribution  
 Adv Integrated Power System  
 Adv Shelter Development  
 Rapid Airfield Assess/Repair

### **Employment**

Global Ionospheric Impacts  
 SSB: Non-Lethal Delivery Mechanisms  
 AMM: Miniature S/M Ordnance Package  
 AMM: Dispensing Concepts  
 Rqmts Study  
 Force Protection Technology  
 Deployed AEF LO Repair

SSB = Small Smart Bomb; AMM = Antimateriel Munition; CCW = C2 Warfare; ADT = Active Denial Technology; LO = Low Observable

Figure 6: Mid-Term



**Readiness**

NONE

**Deployment**

NONE

**Employment**

NONE

SSB = Small Smart Bomb, AMM = Antimateriel Munition, CCW = C2 Warfare, ADT = Active Denial Technology, LO = Low Observable

Figure 7: Far-Term



### **Readiness**

CCW Effects Experimentation  
CCW Source Research  
Remote Sensing Research

### **Deployment**

Prognostics and Health Mgmt

### **Employment**

ADT Application  
ADT Support to ACS  
CCW Applications  
HMMWV System Development  
HMMWV Tech Development  
Remote Sensing Initiative  
SSB: Multiple Event Hard  
Target Fuze

SSB = Small Smart Bomb; AMM = Antimateriel Munition; CCW = C2 Warfare; ADT = Active Denial Technology; LO = Low Observable

Figure 8: Completion



## COMMAND STRATEGIC OBJECTIVE: WEAPON SYSTEMS

**INTRODUCTION:** AFRL is committed to provide all customers with safe, affordable and supportable technologies that meet their needs and expectations. In support of the command objective, we have identified one business area objective.

**S&TBA OBJECTIVE 2:** Incorporate concepts for integrated product and process development into advanced technology development programs to create a fundamental change in the management and execution of S&T programs resulting in technologies that meet war fighters' needs by ensuring safety, affordability and supportability, and effective performance are built into technologies.

**ACHIEVEMENT STRATEGY:** AFRL will change the S&T culture to better meet customer needs by addressing the balance of performance, affordability and supportability. AFRL will create a culture change in S&T that is complimentary to weapon system acquisition processes to facilitate the seamless transition of S&T programs that will meet the war fighters' needs. AFRL transition affordability initiatives address the balance of performance and life cycle cost during the technology development, thereby achieving the best value among available alternatives. This goal for S&T transition affordability is being pursued through the corporate affordability initiatives. Top to bottom culture change will be made with the development and delivery of policy, education, training, and tools in concert with other DOD and industry activities. Integrated product and process development (IPPD) tenets tailored to S&T (Figures 9 and 10) will be an integral part of every new technology program by FY02. Initially, these concepts will be applied to 6.3 advanced technology development programs and selected application to 6.2 programs. The intent is to emphasize the development of affordable performance and cost reducing technologies. AFRL will continue to execute an ongoing training plan for S&T affordability/IPPD. Specialized support programs will be provided through supplemental training, seminars, workshops, on call technical experts, IPPD tools, and web-based collaboration. Policy, instruction, and guidance will be administered through the organized Corporate Affordability Council, led by the commander's designated Associate Director for Manufacturing and Affordability. A set of affordability metrics is established by the DOD Affordability Task Force (ATF) against which selected programs are jointly evaluated annually. Results of the ATF reviews are presented to the Defense Science and Technology Advisory Group measuring the overall effectiveness of AFRL in meeting DOD goals. The ultimate goal of affordability initiatives in AFRL is to maximize the transition potential of affordable technologies so they can compete in the Applied Technology Council (ATC) process, described in Section D. The effectiveness of affordability initiatives will be measured by its contribution to the success of the ATC process to transition technologies per the metrics shown in section D. As part of the ATC process, AFRL will develop transition roadmaps and plans for all 6.3 Category 1 ATD programs. AFRL will establish software tools that will allow our program managers the ability to track and quantify risk and customer satisfaction or desirability. All 6.3 Category 1 programs will develop Return On Investment (ROI) metrics that will be tracked and measured using earned value management techniques. All affordability projects will be reviewed by

AFRL in the areas of Life Cycle Cost, risk, desirability, and interoperability. By implementing affordability initiatives and the ATC process, AFRL will enhance business processes and practices to provide affordable and responsive technology to its customers.

**MILESTONE SCHEDULE:**

Initial Training & Tools to develop Cadre	FY00
Jump Start Projects & Prototype Demos	FY00-FY01
IPPD Behavior incorporated into major Lab programs	FY98-FY02
Customer and Lab Metrics Developed	FY94-FY01
Enhanced Affordability Improvements in Many Lab Programs	FY99-Cont'd

OPR: AFRL/XP

OCR: AFRL/MLMS

RESOURCES: Education and training development and implementation is funded at \$1.2M per FY from FY99-01.

PERFORMANCE MEASURES: TBD by AFRL Corporate Board in late FY00.

EXIT CRITERIA: TBD by AFRL Corporate Board in late FY00.



# S&T Integrated Product & Process Development (IPPD) Approach

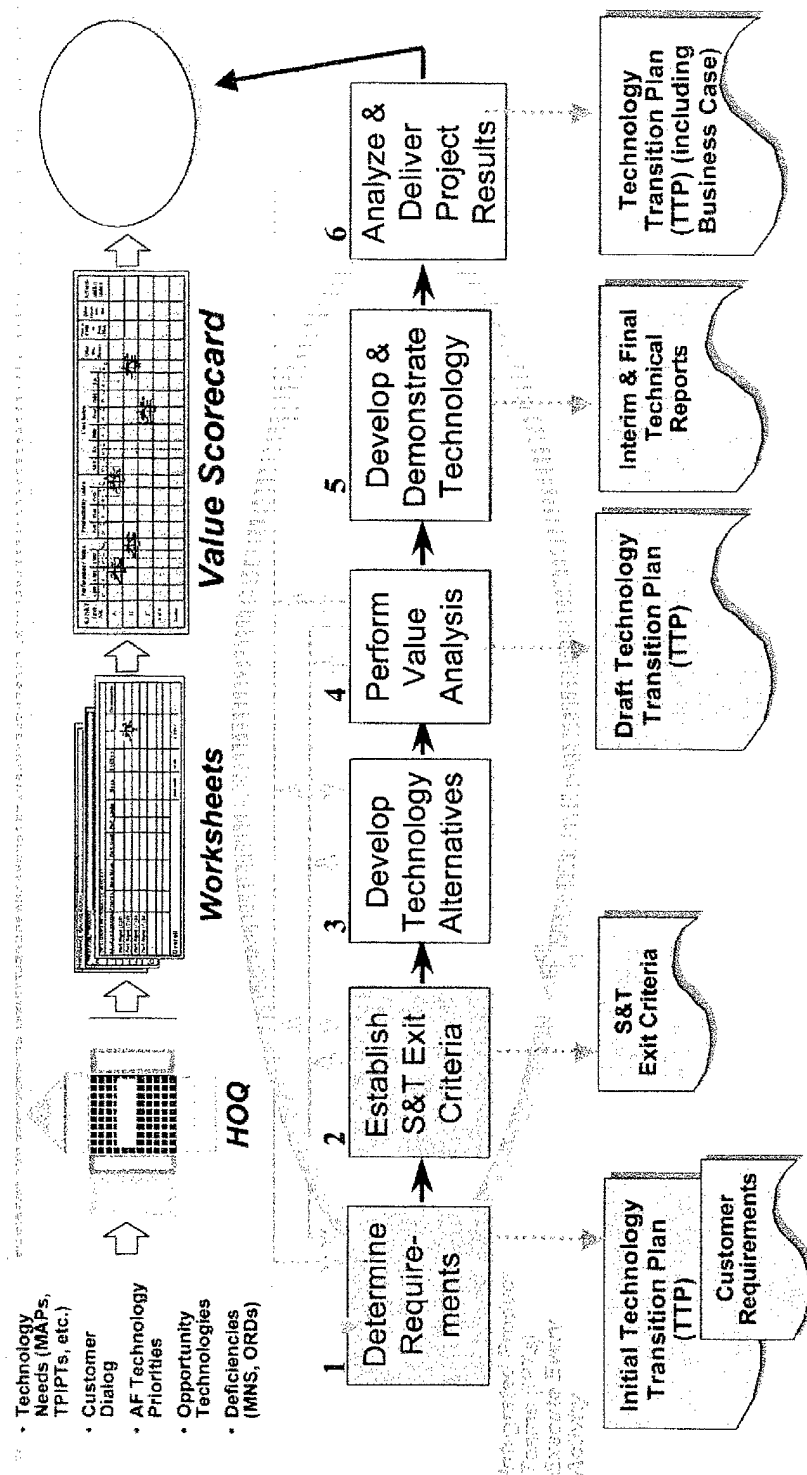


Figure 9: S&T IPPD Approach



# IPPD End-to-End Methods/Tools

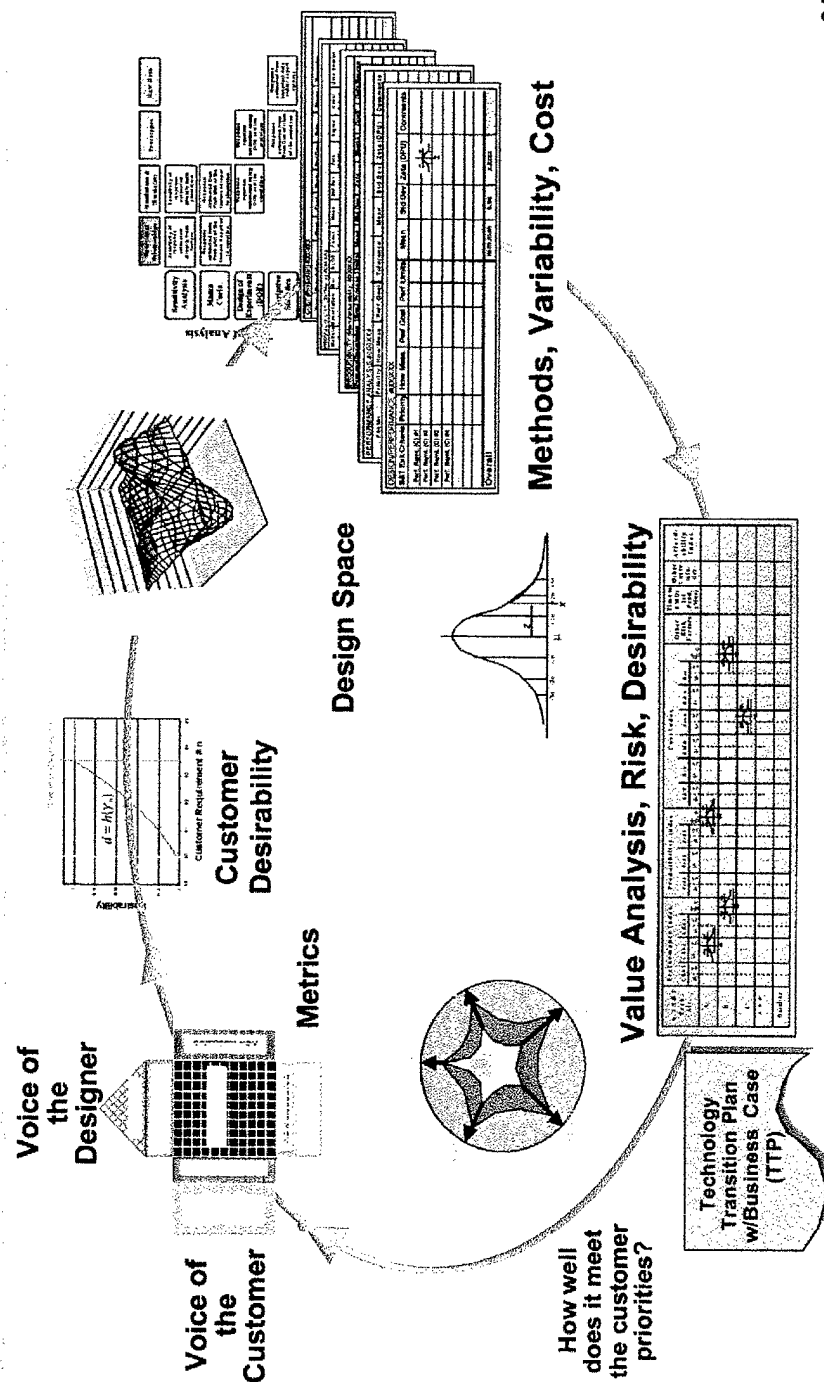


Figure 5: IPPD Methods



## COMMAND STRATEGIC OBJECTIVE: COST

### INTRODUCTION:

S&TBA STRATEGIC OBJECTIVE 3: To reduce the unit cost of goods and services while meeting performance, service and quality standards by FY07. AFRL has identified 3 sub-objectives cost reduction initiatives that will decrease product support costs from \$.24 on the dollar of gross revenue to \$.18 by FY07.

OBJECTIVE 3.1: Reduce manpower resources to enable the 35% RDT&E glide slope to be reached.

ACHIEVEMENT STRATEGY: When AFRL stood up in Nov 97, a Resource Effectiveness IPT was established to look at ways internal to AFRL to assist in reaching the 35% glide slope. The results of this IPT became AFRL's FY00 POM and Civilian Drawdown Initiative (CDI) #78 submissions. This enabled AFRL to take savings from efficiencies and divestitures of 300 in FY99. The savings for FY00 will be 325 and 299 for FY01-999.

AFRL is currently involved in several studies looking at ways to enable a more agile workforce as discussed under the Workforce objective.

MILESTONE SCHEDULE: Vary by directorate and geographic site but all available tools for reducing the government workforce to meet the manpower glide slope will be employed.

OPR: AFRL/HR

RESOURCES: Accomplished within available manpower and funding levels.

PERFORMANCE MEASURES: Managing resources to manpower requirements submitted in the AFRL Manpower Execution Template (FY98-05).

EXIT CRITERIA: This objective will be accomplished when efficiencies and divestitures through FY01 are realized.





**OBJECTIVE 3.2:** Reduce contractor support in line with government workforce reductions to ensure a total workforce reduction.

**ACHIEVEMENT STRATEGY:** As government manpower reductions occur there is a tendency to fill vacant positions with contractors rather than improve processes. In order to get an accurate and credible account of the amount of contractor support being used in AFRL, definitions and procedures will be established by AFRL/FM, AFRL/HR, AFRL/PK, and AFRL/BC. This information will be used to identify which areas to divest from and formulate a divestiture plan.

**MILESTONE SCHEDULE:**

Gather contract data	4QTR/00
Identify A&AS contracts	4QTR/00
Develop baseline	1QTR/01
Develop procedure to identify, track and report data	2QTR/01
Identify a full-time position in AFRL/BC	1QTR/02

**OPR:** AFRL/BC

**OCRs:** AFRL/FM, AFRL/PK and AFRL/HR

**RESOURCES:** Will seek one additional full-time position for AFRL/BC.

**PERFORMANCE MEASURES:** Reduction in contract support will be reported quarterly against the divestment schedule and baseline.

**EXIT CRITERIA:** This objective will be met when divestments have occurred.

### OBJECTIVE 3.3: Improved Information Management Systems for Decision-Making Supporting Improved Business Practices

**ACHIEVEMENT STRATEGY:** The information, and the systems which collect, manipulate and report it, must enable management to make informed strategic decisions, and must enable the functional workers to effectively pursue their collective mission supporting AFRL. To support AFRL's information needs, and Enterprise-wide Business System is being considered and must achieve the following:

1. Vertical Integration – Multiple systems that are in use within a functional area must operate from a single logical source of data. Integration among systems should be automated and seamless, and a unified user interface should be presented where possible.
2. Horizontal Integration – Data must be shared across functional areas. Information should be collected once, then presented in a comprehensive view to the appropriate personnel.
3. "Information Please" – Give the users access to the information they need to accomplish their mission.
4. Corporate View – Provide a consolidated view of data in an MIS which supports making informed strategic business decisions that are based on up-to-date, accurate information.

AFRL will deploy a common desktop and e-mail environment over FY00. We also expect to deploy several collaborative tools that will enhance the researcher's environment including virtual library search aids and sophisticated knowledge-ware tools for information sharing and discovery. The AFRL Intranet effort is also anticipated to be a collaboration environment.

#### MILESTONE SCHEDULE:

Establish a program office to support EBS	FY99
Deploy Common desktop and e-mail	1QTR/FY00
Deploy collaborative tools	FY00-FY03

OPR: Computer Information Office (CIO)

OCR: AFRL/XPT

**RESOURCES:** This objective will be accomplished using available manpower and funding.

**PERFORMANCE MEASURES:** A series of best-practice benchmarks will be selected based on the requirement process. An efficient enterprise maintenance agreement is expected to result in 20% MIS cost savings over the next 3 years.

**EXIT CRITERIA:** This objective will have been met when the deployments have been accomplished.

## COMMAND STRATEGIC OBJECTIVE: WORKFORCE

### INTRODUCTION:

S&TBA STRATEGIC OBJECTIVE 4: To provide a trained, flexible workforce of sufficient size with the appropriate skills mix and expertise by FY05 to do the AFRL mission. Two sub-objectives, Skills Mix and Laboratory Demo, have been identified to meet the Workforce objective.

OBJECTIVE 4.1: Evaluate the workforce to ensure the right mix of skills will fulfill challenges associated with AFRL's increased investment in space technology.

ACHIEVEMENT STRATEGY: The Manpower and Personnel Subcommittee (MPSC) was established to take the lead in workforce issues. It develops policy, processes and the framework for manpower and personnel. The MPSC is chaired by AFRL/CD and membership consists of AFRL/CA, CV, HR, XP and the Technology Directors. The MPSC will use a three-step process to achieve this objective:

Step 1 – Assess AFRL's current skills mix of military and civilian employees. A database will be developed, information collected and analyses performed.

Step 2 – Define the "right" mix to perform AFRL's mission.

Step 3 – Use the full spectrum of government personnel options and contractor support to shape the workforce to match the defined requirement.

### MILESTONE SCHEDULE:

Step 1: Assess skills mix	FY99
Step 2: Define right mix	FY00
Step 3: Shape to requirement	FY05

OPR: Manpower and Personnel Subcommittee

OCR: AFRL/HR

RESOURCES: Training and education funds, and contractor support as required.

PERFORMANCE MEASURES: AFRL's workforce will be measured against the AFRL Objective Workforce as well as the demographic goals set forth in the AFRL Strategic Plan.

**EXIT CRITERIA:** This objective is a continuous process with no definite end state. The MPSC will regularly review AFRL's workforce position to ensure the proper skills mix and expertise are in place to continue enhancing our mission even beyond the current FY05 studies.

#### **OBJECTIVE 4.2: LAB DEMO**

Institutionalize Lab Demo, empowering supervisors to shape the workforce to better accomplish AFRL's mission.

**ACHIEVEMENT STRATEGY:** The Air Force Lab Personnel Demonstration Project (LPDP) consists of a number of initiatives. The key initiatives are: simplified position classification, four broadbands replacing seven General Schedule (GS) grades, voluntary emeritus corps, longer probationary period, expanded developmental opportunities program, new awards program, FEPCA delegation and contribution-based compensation (CCS). With the exception of the awards program, these initiatives are all initially applicable only to the approximately 2500 scientists and engineers (S&Es) within specific job categories. The inclusion of the remainder of the AFRL workforce (except SES and ST employees) is still being considered. AFRL/HR has a full-time project office to manage all aspects of the program including execution, training, reporting and evaluation.

#### **MILESTONE SCHEDULE:**

Initial Implementation:	Mar 97
Decision to include non-S&Es:	1QTR/FY00
Decision to continue, modify or reject	Mar 02

**OPR:** Lab Demo Office

**OCR:** AFRL/HR

**RESOURCES:** Four civilians as project office, contractor support (Systems Research and Applications Corp), and funding for TDYs and continued contractor support.

**PERFORMANCE MEASURES:** The AFRL Project Evaluation Committee (PERC) coordinates collection and internal evaluation/distribution of data based on empirical and statistical analysis of personnel information, employee/supervisor surveys and focus groups, relevant site history records, and quality measures.

**EXIT CRITERIA:** The Demonstration Project has a programmed decision point 5 years into the project for continuance, modification or rejection of the initiatives based on the evaluations being performed by both the Air Force and OPM.

## COMMAND STRATEGIC OBJECTIVE: INFRASTRUCTURE

### INTRODUCTION:

**S&TBA STRATEGIC OBJECTIVE 5:** Further reduce product support costs by “rightsizing” AFRL facilities and land, capital equipment and software in line with manpower, mission and funding.

**ACHIEVEMENT STRATEGY:** This objective will be accomplished using a five-step iterative process for facility and land, and capital equipment classes. (The first iteration of the facilities and land class nears completion):

Step A – Define the S&T business area’s outputs and methodology.

Step B – Determine required infrastructure needed to support AFRL’s end-state mission. Grow this step into using objective, mathematically-based relationships.

Step C – Capture the current infrastructure condition.

Step D – Identify and quantify the constraints that prevent the business area from achieving a perfect match with Step B’s mathematically developed relationships.

Step E – Conduct “Gap” analysis comparing end-state requirements with the current infrastructure condition taking constraints into account. Produce action plans.

- Software class: This class will use a software development methodology:

Step A – Define the current S&T business area’s outputs and methodology for each of S&T’s major functional areas (XP, HR, FM, and I&O) and produce appropriate operating instructions.

Step B – Identify business process improvements that add value in the eyes of these users in support of AFRL’s end-state mission.

Step C – Develop functional and infrastructure system requirements needed to enable best practices identified by the TD functional area leaders in Step B.

Step D – Compare candidate Government off the shelf (GOTs) and applicable commercial off the shelf (COTs) infrastructure solutions with functional and system requirements defined in Step C. TD functional area representatives will guide the selection of an optimal solution. AFRL/CCI will prepare results for presentation to the AFRL Corporate Board for approval and funding.

Step E – Implement approved project via “build contractor” with the assistance of TD functional representatives emphasizing affordable, evolutionary implementation.

S&T business area prioritized "capital infrastructure classes: and is implementing Capital Asset Management. S&T will support other business area OPRs leading infrastructure classes and will focus S&T business area efforts as follows:

- Facilities and land class management has been in process for over a year and will be the priority through FY00.

- Capital equipment class management baselining and tool development is underway and will receive increased emphasis starting 3QTR/FY00.

- Software class management is underway using normal software development methodology for S&T business area-wide "Enterprise Business System" project. The project is in the requirements development and business process re-engineering phase through 4QTR/FY00. The implementation phase schedule is driven by the requirements phase's product and will likely begin in FY01.

MILESTONE SCHEDULE: S&T business area manages to more detailed capital infrastructure class execution schedules. To complete the above planning process's first iteration (by capital infrastructure class) or software development process:

Facility and Land	2QTR/FY00
- Senior task force-developed requirements	4QTR/FY00
-Objective-based requirements	2QTR/FY01
Capital Equipment	
Enterprise Business System Project	
-Requirements Development Complete	4QTR/FY00
-Implementation Complete	TBD

OPR: AFRL/CV and Deputy Technical Directors, AFRL/CCI

OCR: Technical Directorate Operations and Facility Officers

RESOURCES: Allocations for database construction, use and reports. Achieving facility and land objectives depends on continuous and adequate AFMC funding for Military Construction and remediation projects. Resources needed by the Enterprise Business System Project will be estimated during the requirements phase.

PERFORMANCE MEASURES: S&T business area's capital infrastructure classes have/will be baselined. We will track planned/actual progress achieving AFMC's rightsizing measures. S&T business area will participate and monitor Section 913 Panel to identify Department of Defense infrastructure benchmarks useful to S&T business area management.

EXIT CRITERIA: This objective will be considered to be accomplished when product support costs meet the \$.018 target (FY07).